

The Shepherd Color Company

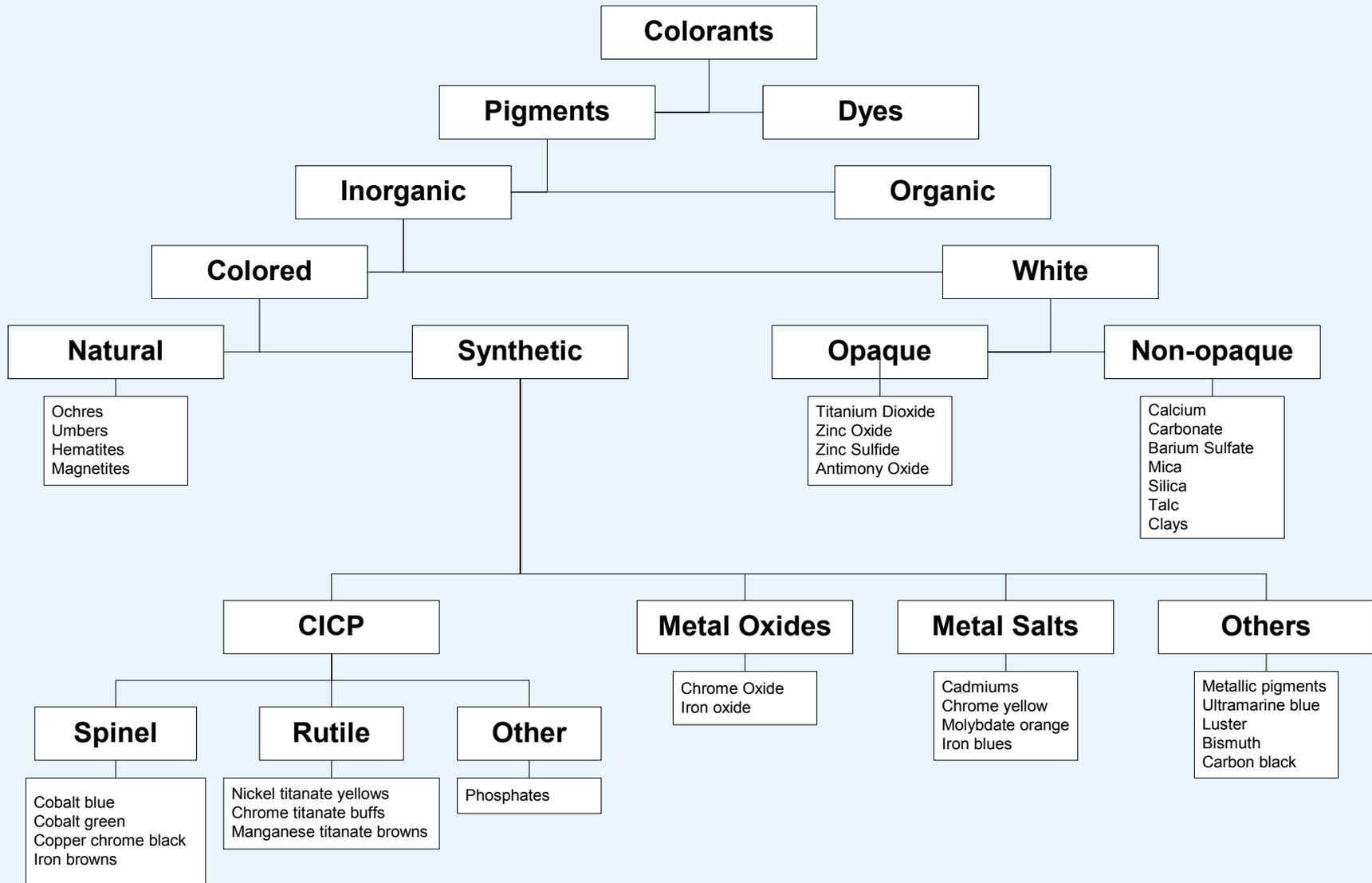


Over 70 years' experience

- Based in Cincinnati, Ohio, USA
- Established 1916
- Family Fourth Generation



Pigment Classification System



Markets Served

- Roofing granules
- Metal building products
- Vinyl siding, Windows, Doors
- Automotive
- Wood coatings
- Military



Attributes

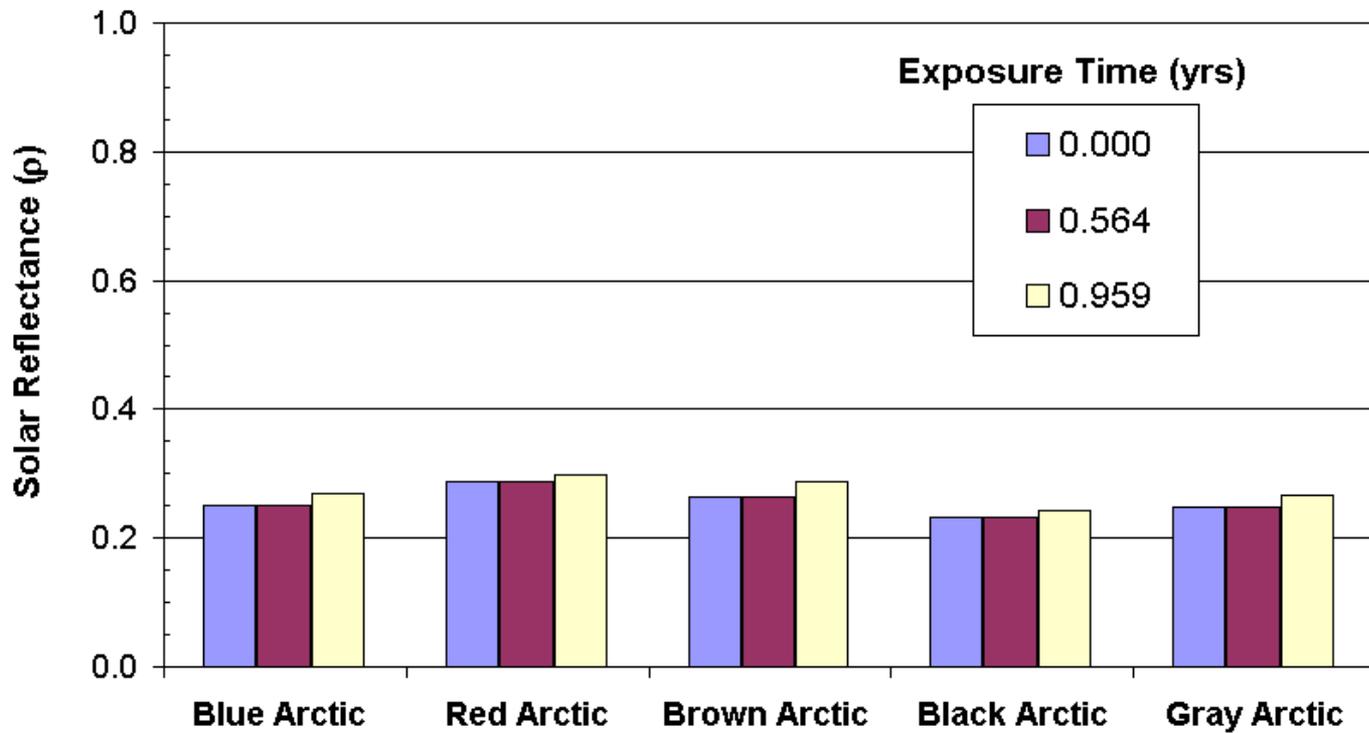
- Heat Stable
- Weather Resistant
 - Samples placed at CA exposure sites
 - Offer to provide Accelerated weathering time
- Chemical Resistance
- Acid Rain & Salt Spray Resistant
- Compatibility

Concrete and Clay Tile and Painted Metals under exposure

Clay and Painted Metal exposed for 1½ years



Concrete Samples Exposed in Sacramento, CA.



“Cool” Activities

- Associations
 - NCCA
 - CMRC
 - PAC
- Tradeshows
 - NRCA, WSRCA
 - Metalcon, ICE
 - CSI
 - NPE, ANTEC, VSI



Market Education

On the HUNT for COOLER PRODUCTS?

- Publications
- Literature

Keeping the heat down

IR reflective pigments are increasingly being used to keep roofs cool. Jeff Nolan explains how they can save energy by decreasing heat build-up.

Our Company Colors are Black and Red but Our Products are Green

...technology to reduce energy consumption... that's why we're green.

The Temperature of COLOR

...techniques

The Temperature of COLOR

The Rest of the Story

Jeffrey D. Nixon

cool roofing The Chemistry Behind 'Cool Roofs'

By James D. Noon

The huge, and growing, interest in building materials shows no signs of slowing down. Infrared-reflective, or 'cool', roofing is one of the most talked about of these technologies. It is also one of the most recent.

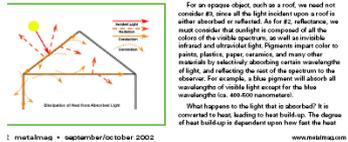
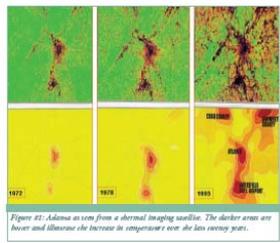
Many current references equate 'cool roofing' with white roofing. Certainly white roofs are good reflectors of the sun's heat. However, offering 'any color as long as it's white' is not a viable design strategy. Fortunately, today's pigment technology allows for the design of products that sunken cool under the sun - without losing their color. The benefits include energy savings, longer product life, cooler cities, and improved quality of life.

Ecological and Economical Benefits

Newly developed pigments with increased infrared (IR) reflectance counter color-induced heat buildup. This is important for many reasons.

Cool Products Last Longer

One simple way to preserve materials is to mitigate heat. Heat accelerates chemical reactions, including those responsible for the degradation of physical, chemical or optical properties. Reflecting pigments mitigate accelerated heat buildup, and the destructive events associated with it.



It's the pigment!

5% of the solar radiation arrives as ultraviolet (UV). Principally absorbed by polymers, protection is afforded by UV-absorbing additives and the presence of white pigments, such as TiO₂.

45% of the solar radiation arrives as visible radiation. The absorption (or reflection) is governed by the colorants used.

WHAT YOU SEE IS WHAT YOU GET!!!!

50% - the remaining solar radiation arrives as infrared (IR) radiation. The result is absorption and additional heat build-up. Polymers and additives have little effect.

ONLY THE CHOICE OF THE PIGMENT MATTERS!

WHAT YOU DON'T SEE IS WHAT YOU GET BY CAREFUL DESIGN!!!!

ARCTIC
Infrared Reflective Pigments

Arctic™ pigments are high performance inorganic ceramic pigments. Designed to withstand the harshest environments, color retention and infrared reflecting properties of Arctic pigments will often outlast the service life of the product.

Arctic™ pigments are designed to reflect infrared radiation. Incorporation of these pigments will transform the performance of your products.

- Heat destroys material properties.
- Thermal expansion and contraction leads to warping, distortion and even part failure.
- Prolonged heat degrades colour, gloss, flexibility and other mechanical properties.

Examples of suitable applications:

- Vinyl siding, fencing, railing and decking
- Single ply roofing membranes, polymeric roof tiles
- Automotive interior & exterior parts
- Lawn & Garden Furniture, Outdoor play products & toys
- Interior and exterior window treatments

Shepherd
The Shepherd Color Company
We Brighten Lives

The Future is Lookin' Cool...

Black 10C909 : Arctic Innovation

The search for energy-efficient and environmentally-friendly products has driven recent advances in infrared-reflecting technology. Enabling this trend are infrared-reflective pigments - colored powders that turn back the sun's heat. EnergyStar™ compliant roofing, vinyl siding that doesn't warp, automotive compounds and paints for cool car interiors - these applications and many more benefit from the use of these pigments.

Recent options in IR-reflecting pigments left a gaping hole. There were no cost-effective pigments that exhibited true deep black color and still delivered a high level of solar reflectivity. Shepherd scientists went to work...

The Shepherd Color Company introduces Black 10C909, the newest addition to our Arctic™ line of infrared-reflective pigments. Other blacks make you choose between high reflectivity, true black color, or cost-effectiveness. Black 10C909 offers a "no-compromise" solution!

Black 10C909 Masstone

True deep black : More color options

Until now, the blacks that exhibited the greatest reflectivity were the least "black". That is, their brown undertones made

High IR-reflectance : Low heat build up

Making a new black that meets the U.S. EPA's EnergyStar™ threshold of 75% Total Solar Reflectance for steep slope flat for formulators. One had to decide on which for a Black 10C909, the task has

ARCTIC
Infrared Reflective Pigments

ARCTIC Pigments for Coatings

Black 10C909	Green 223	TSR: 24%
Black 411	Brown 12	TSR: 25%
Blue 385	Brown 157	TSR: 30%
Orange 8	Orange 20C18	TSR: 13%
Blue 424	Blue 10C21	TSR: 25%
Brown 19	Blue 10C11	TSR: 32%
Green 201	Green 223	TSR: 19%
Green 410	Green 410	TSR: 26%
Yellow 10P110	Yellow 10P110	TSR: 28%
Yellow 10P225	Yellow 10P225	TSR: 65%
Yellow 10P270	Yellow 10P270	TSR: 65%

ARCTIC
Infrared Reflective Pigments

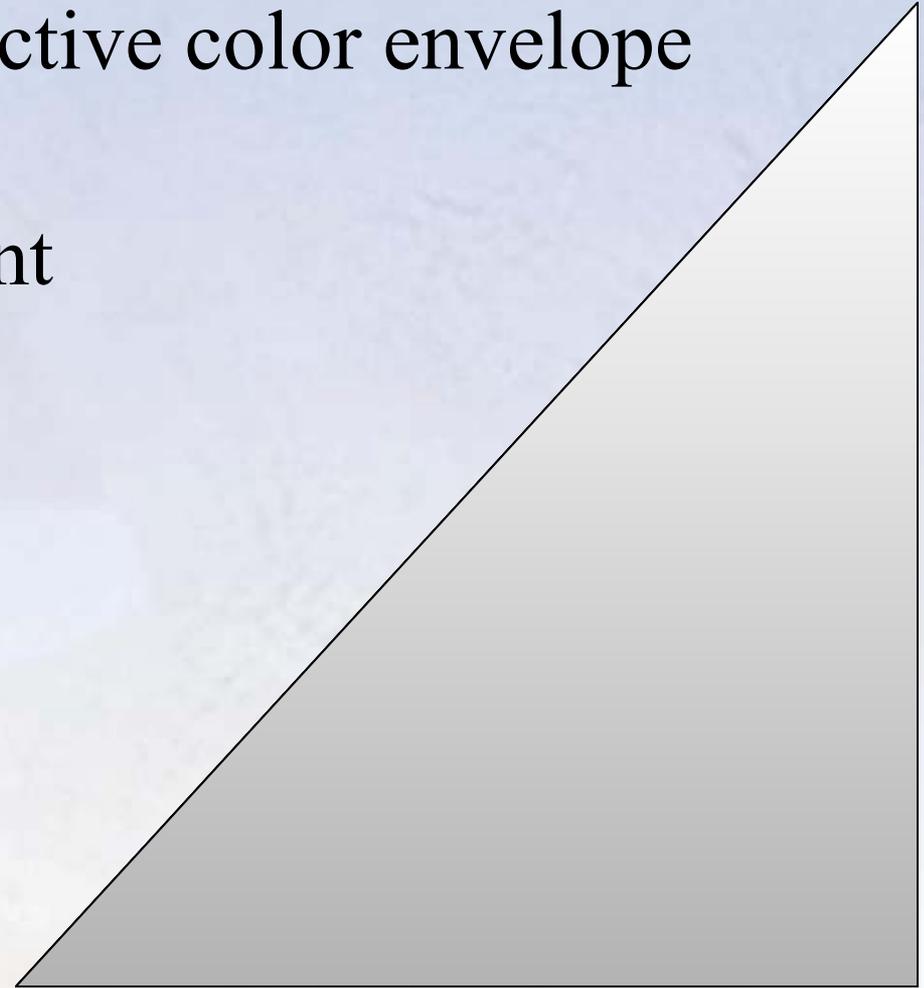
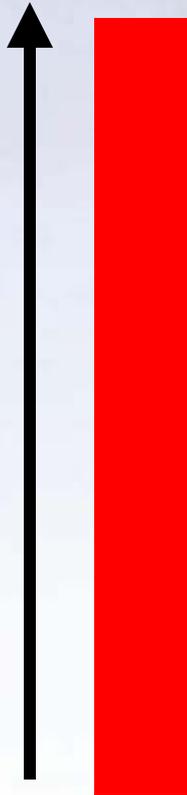
Plastics Applications

Color Choice

- Even with IR technology, increasing reflectivity requirements reduce effective color envelope

Reflectivity Requirement

TSR



Obtainable Roofing Colors

Shepherd: View of Future

Research Direction: Market Focus

- Cooperate with LBNL, ORNL, Industry to improve reflectance of roofing materials
- Things that work and are durable
 - darker colors / higher TSR
- Increasing reflectance to 40% - number of color choices drops considerably
- Shepherd active R&D to push pigment technologies; Darker, Jetter, Higher TSR
- Overcoming inertia of downstream customers
- Continue to exhibit / promote “Arctic” cool technologies

